MARINE MAMMAL SPECIES OF INDIA

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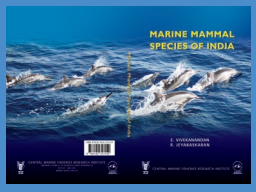

Cover photograph:
A pod of spinner dolphins (*Stenella longirostris*) sighted off Dwaraka, Gujarat on 23.03.2009

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Foreword

Central Marine Fisheries Research Institute has collected and published information on occasional stranding, sightings and gear entanglement of marine mammals for more than 50 years from a vast network of trained field staff located at its research and field centres along the entire Indian coast. More than 85% of the publications on marine mammals in India is by the CMFRI. The Institute has executed a research project on marine mammals during 1981 – 1985 and a long term project funded by Ministry of Earth Sciences, New Delhi during 2003 – 2012.

However, several enigmatic facts on marine mammals of India such as species habitat ranges, migration pattern, socializing behaviour and abundance remain to be investigated. Low encounterability at sea, difficulties in handling the stranded / beach-cast animals due to their large body mass and high cost of executing research programmes on marine mammals are few constraints which prevent gaining an insight into these megafauna. Availability of only a very few experts in the country is another major concern in addressing several issues, and hence, it is imperative that the country should produce a large pool of expertise to investigate the marine mammals.

To create interest and awareness among students, researchers, naturalists and conservationists on marine mammals occurring in the Indian seas, the researchers of CMFRI have prepared a species profile, which provides basic and interesting information on these charismatic animals. They have compiled results of CMFRI research projects on marine mammals and available information from a large body of literature so that this publication serves as a source of ready reference to those interested on marine mammals. I compliment the authors Dr. E. Vivekanandan and Dr. R. Jeyabaskaran for this effort. I sincerely hope that this publication will pave the way for producing a large number of marine mammalogists in the country to undertake advanced research on marine mammals in India and in the region as well.

Kochi – 18
August, 2012

G. Syda Rao
Director

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Dr. K.S.S.M Yousuf, Dr B. Anoop, Mr. V.V. Afsal, Dr A. Anoop, Dr. P. Kannan and Mr. K.S. Abhilash, Senior Research Fellows participated in a number of oceanic cruises, each lasting for several weeks to observe marine mammals. Their interest and untiring field work provided valuable original information on marine mammals in India. The support rendered by all these dedicated researchers is gratefully acknowledged. Special thanks are due to Dr K.S.S.M. Yousuf, who gathered a large volume of literature and also assisted preparation of this manuscript. We also thank Dr. P.P. Manojkumar and Shri K.P. Said Koya, Senior Scientists and Dr. V. Kripa, Head, FEMD, CMFRI, for their contribution and support. We are thankful to Shri K. Sankaran, Artist (T-5), CMFRI for assistance in preparing the manuscript.

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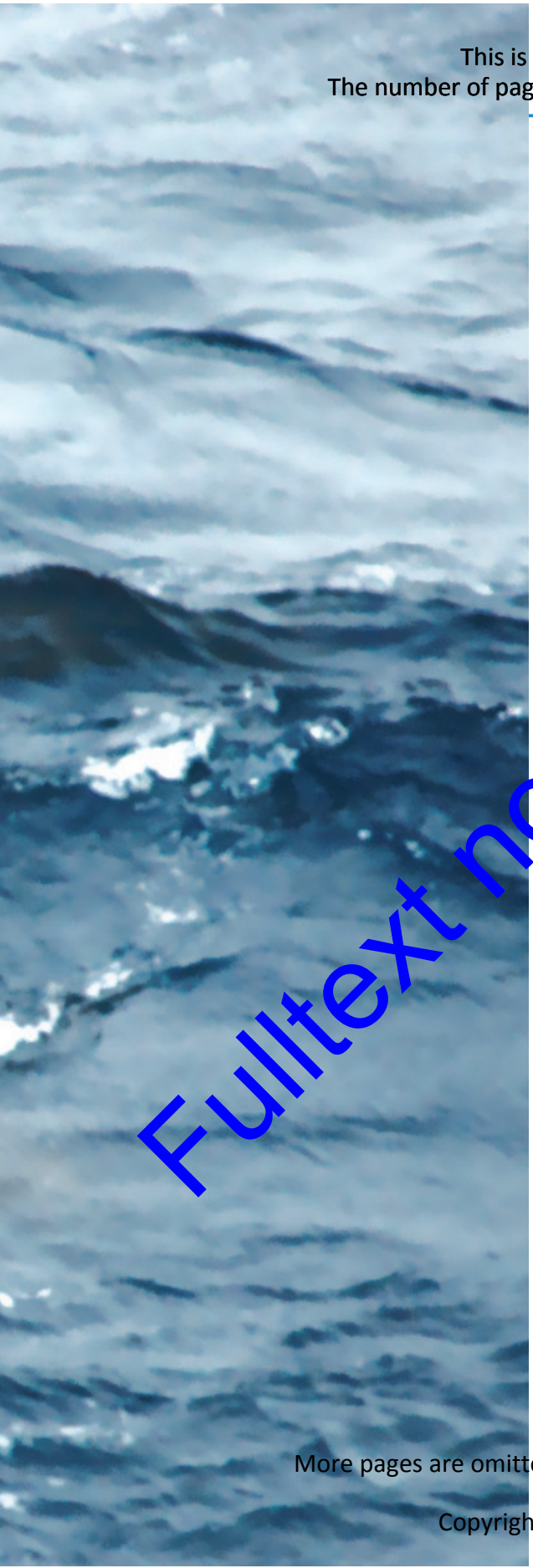
Fig. I. A male *Orcinus orca* with triangular dorsal fin sighted in Southern Ocean (52°58'S; 45°04'E) on 21.02.2011



Introduction

Marine mammals are important components of marine ecosystems. Due to wide distribution, large body size and predatory nature, these charismatic animals exert major influence on marine food webs and structure and function of marine ecosystems. Marine mammals are highly mobile with complex habitat requirements and are distributed unevenly across oceans ranging from tropical, subtropical, temperate and polar regions. Estuaries, tributaries and contiguous seas of the world's largest rivers are habitats for few cetaceans and sirenians (dugong). Some regions such as tropical, subtropical and temperate maintain extremely diverse cetacean species assemblages, whereas polar regions support only a few species.

Marine mammals are classified under three major orders, namely, Cetacea (whales, dolphins and porpoises), Sirenia (manatees and dugong) and Carnivora (sea otters, polar bears and pinnipeds). Totally 130 marine mammal species have been recognised in the world oceans (Jefferson *et al.*, 2008). Among the three Orders, Cetacea is the most diverse, having evolved from land-dwelling ancestors around 55 to 60 million years ago and are known to occur in all marine habitats (Reeves *et al.*, 2002). Order Cetacea consists of two suborders namely, Mysticeti (baleen whales) and Odontoceti (toothed cetaceans). Mysticeti represents four families of 14 species, while Odontoceti represents ten families of 73 species (Jefferson *et al.*, 2008).

The Indian seas support a variety of marine mammals, which include baleen whales, toothed whales, dolphins, porpoise and dugong. Stranding and sighting records show that the Indian seas is a habitat for 25 species of cetaceans and one species of sirenian. Of the 25 species of cetaceans, five are Mysticeti (baleen whales) and the rest are Odontoceti, which includes Delphinidae, Physeteridae, Kogiidae, Ziphiidae, Phocoenidae and Platanistidae (Kumaran, 2002). The sei whale *Balaenoptera borealis*, which has been recorded in stranding events by many authors, has been confirmed as misidentification, and hence, is not included in this book. Records on global distribution of *B. borealis* do not include Indian seas (Rice, 1998; Horwood, 2009).

Fig. II. A pod of *Orcinus orca* sighted in Southern Ocean (52°18'S 45°04'E) on 21.02.2011

All marine mammal species are protected under Wildlife (Protection) Act 1972. However, until the year 2003, knowledge on marine mammals of India was restricted to incidental catches of various species in fishing gear. A few authors have recorded morphological characters, osteology, biology and stomach contents of stranded or beach-cast cetaceans. Between 2003 and 2011, the Central Marine Fisheries Research Institute undertook research work on marine mammals with financial support from Ministry of Earth Sciences, Government of India. The results of the project substantially increased the knowledge on marine mammal distribution in the Indian seas. However, an understanding on species distribution ranges and abundance in Indian seas remains vague. Absence of trained marine mammalogists, dedicated ship surveys and allocation of substantial financial support for marine mammal research has handicapped the progress in research to gain an insight into species level distribution, abundance, biology and ecological characteristics of these diverse animals. Marine mammal Surveys were also conducted in Southern Ocean to Study the distribution of cetaceans in Antarctic waters (Fig. I & II).

This book is a collective source of information on marine mammal species in the Indian seas. The book has the following four chapters: Introduction, Distribution, Species Profile and Future Directions. Under the Chapter Species Profiles, information are provided under the following 10 subtitles: 1. Taxonomic status; 2. Common name; 3. Identification characters; 4. Distribution; 5. Abundance; 6. Habitat; 7. Behaviour; 8. Food; 9. Exploitation and threats; and 10. Conservation status. Available records on sightings, stranding, incidental catches and food habits of marine mammals have been consolidated and presented in this book. Information on species occurring in the Indian seas, but published from other habitat ranges in world oceans have also been included to enhance comprehensiveness of this book. The book is intended to create awareness and interest among students and researchers who want to learn about marine mammal species occurring in the Indian seas. Images captured during sighting cruises are given for a few species. Maps given in this book will be useful to infer the occurrence and distribution of species.

To get more information on species described in this book and on other species not occurring in the Indian seas, the readers are encouraged to refer the following fact sheets:

1. Encyclopedia of marine mammals;
2. Marine mammals of the world;
3. Marine mammals of the world FAO species identification guide;
4. The society for marine mammalogy;
5. http://www.marinemammalscience.org.

Fig. IV. A pod of leaping *Stenella longirostris* sighted off Dwaraka, Gujarat on 23.03.2009

The observers participated in 55 cruises. The number of observation days was 1048 and cetaceans were sighted on 430 days. The duration of observation was 7058 hours. A total of 976.7 hours were spent for observation in the Northeastern Arabian Sea, 2852.8 hours in the Southeastern Arabian Sea, 908.0 hours in the Northern Bay of Bengal, 320.0 hours in the Southern Bay of Bengal, 930.5 hours in the Andaman Sea and 397.0 hours in the Southern Sri Lanka Sea (Indian Ocean). The total number of sightings in all the regions was 626, which comprised of 8674 individuals (Table I). On an average there was one sighting every 11 hours. The cetaceans were sighted at a distance ranging from 0.05km to 964km from the shore, near water surface where the maximum depth ranged from 15m to 4515m, at sea surface temperature (SST) range from 24.2°C to 32.0°C, salinity from 27.5ppt to 37.6ppt, and sea condition ranging in Beaufort scale from 0 to 7. From the sighting surveys, it was found that the cetaceans are widely distributed in the Indian EEZ and the contiguous seas (Fig. III-VI). A total of 219 sightings (35%) were within the continental shelf (<200m depth) and the remaining (65%) were in oceanic waters (>200m depth). Maximum number of sightings was during 1500-1800 hrs, in which 31% of the total sightings were recorded. Only 5% of the sightings were after 1800 hrs, as observation could not be carried beyond 1900 hrs on most of the days due to poor visibility.

In sightings surveys,18 species were recorded (Table1). But species could not be identified on all occasions. In 361 instances i.e. 57.7% of the sightings, identification was made up to generic or species level, either as confirmed or as 'possible'. The remaining 265 sightings (42.3%) were recorded as unidentified dolphins (UID)/ unidentified whales (UIW). Of the 18 species identified, 6 were whales and 12 were dolphins. The six whales include 5 species of baleen whales and one species of toothed whale. *Stenella longirostris* was the most abundant (1945 individuals) followed by *Tursiops aduncus* (887). However, *Sousa chinensis* was encountered in mazimum number of sightings (57).

Suborder Mysticeti

Baleen whales

Fig. 1a. A spouting *Balaenoptera musculus* sighted off Mangalore, Karnataka on 16.10.2010

Balaenoptera musculus

Blue whale

Fig. 1b. *Balaenoptera musculus* stranded at Kundugal, Mandapam, Tamilnadu on 17.07.2006, showing a clearly visible single prominent median ridge

Stenella attenuata

Pantropical spotted dolphin

Fig. 19a. A *Stenella attenuata* sighted off Kakinada, Andhra Pradesh on 31.08.2009, showing the presence of white beak tip and white dorsal spotting in the body

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Pantropical spotted dolphin *Stenella attenuata* (Gray, 1846)

19.1 Taxonomic status

Phylum: Chordata; Class: Mammalia; Order: Cetacea; Suborder: Odontoceti; Family: Delphinidae; Genus: *Stenella*; Species: *attenuata*

19.2 Common names

Pantropical spotted dolphin; Bridled dolphin; Narrow-snouted dolphin; spotters

Taxonomy of the spotted dolphins was long confused, with specimens of this species classified under various species such as *S. attenuata*, *S. frontalis, S. plagiodon, S. roenatus, S. pernettyi* and *S. dubia* (Her-shkovitz, 1966). Finally one pantropical species (*S. attenuata*) was recognized in revision and a second species (*S. frontalis*) is highly variable geographically in size, tooth size, and colour pattern and endemic to the tropical Atlantic Ocean (Perrin *et al.*, 1987). Both species have similarity in skull, but did not appear as sister taxa in phylogenetic analysis based on cytochrome b mtDNA sequences (LeDuc *et al.*, 1999).

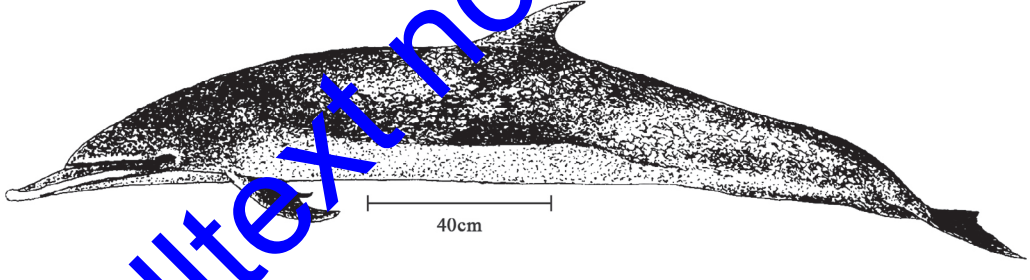

Fig. 19b. Pantropical spotted dolphin *Stenella attenuata*

19.3 Identification characters

The pantropical spotted dolphins (Fig. 19a&b) like other species of the genus *Stenella*, are relatively small dolphins growing to a maximum length of 2m and weighing approximately 114kg at adulthood. Body is generally slender, streamlined and have a long thin beak that is separated from the melon by a distinct crease. The dorsal fin is narrow, falcate, and usually pointed at the tip. Flippers are slender and strongly curved. Colouration of lower sides of adults is grey with dark cape on dorsal side. The lower belly, lips and tip beak tend to be brilliant white. Although unspotted at birth, by adulthood the dolphins have varying degrees of white mottling on the dark dorsal cape. The spotting ranges from very slight in offshore animals to heavy in coastal dolphins. A dark grey band encircles the eye, and continues forward to the apex of the melon. A dark stripe runs from eye to flipper. In each row 34 to 48 slender, sharply pointed teeth are present.

these species and sea birds in the eastern tropical Pacific (Peddemors, 1999). Females and males attain sexual maturity at the age of 10 years and 12 years, respectively. Lifespan is approximately 40 years. Gestation lasts approximately 11.5 months (Perrin, 2009).

19.8 Food

They feed mainly on small epipelagic and mesopelagic fishes and squids. Some other foods are taken, such as nemertean worms and crab larvae (Sekiguchi *et al.*, 1992). Significant differences in prey composition by season and geographic region indicate that they are flexible in their diet. Female diet preference varies with reproductive state in particular, lactating female feed on a greater proportion of fish than squid, because of higher calorific value (Ross, 2006). The pantropical spotted dolphins feed at night when many mesopelagic species migrate toward the surface. In eastern tropical Pacific, stomach content showed fishes like lanternfish (family Myctophidae) and the most commonly found cephalopods (family Ommastrephidae) (Roberston and Chivers, 1997). The dominance of mesopelagic prey and higher stomach fullness were observed during the morning hours.

19.9 Exploitation and threats

By-catch in fisheries around the world is a major threat. They are often taken in gillnet fisheries in Australia, central North Pacific, coastal Peru and Ecuador, Japan, northern Indian Ocean, Sri Lanka, Solomon Island, Philippines, Taiwan, western North Pacific, and other areas. Association of these dolphins with yellowfin tuna has made them more vulnerable to tuna fishery. In the eastern tropical Pacific, takes of hundreds of thousands has reduced the northern offshore stock to an unknown degree (Wade, 1995). They are subjected to high mortality in other fisheries, including drive fisheries in Japan and harpoon fisheries for human consumption. Incidental catch of these dolphins has been reported in Indian gillnet fisheries (Yousuf *et al.*, 2008). However this species is taken less often and thus, unlike the spinner dolphins, they are less vulnerable to gillnet fisheries in India.

19.10 Conservation status

The species is listed in Appendix II of CITES. Protected under Indian Wildlife (Protection) Act, 1971.

IUCN status: Least Concern

Indian status: Date Deficient

Fig. 19e. A *Stenella attenuata* sighted off Kakinada, Andhra Pradesh on 31.08.2009, showing the slender strongly recurved flipper and pointed falcate dorsal fin

Fig. 20e. *Stenella coeruleoalba* stranded at Vizhinjam, Kerala on 19.09.2007, clearly showing the white belly and dark grey dorsal cape which is separated by a light grey thorax.

Heteroteuthis dispar). Northeastern Atlantic striped dolphin often feed on fish (lanternfish) but mainly on cephalopods (*Teuthowenia megalops* and *Histioteuthis* spp) and crustaceans (*Sergestes arcticus* and *Pasiphaea multidentata*). Myctophids fish predominated the prey in the specimen collected from Japan and South Africa. They feed between the water columns from 200m to 700m depth.

20.9 Exploitation and threats

Historically, this species has been targeted in direct and indirect fisheries in Japan, France and Spain. Drive and hand-harpoon fisheries in Japanese waters killed around 3825 striped dolphins during 1981-1993. Striped dolphins are still caught in Japan with allowed quota of 700 animals. Striped dolphins are also taken in the drive fishery at Malaita in the Solomon Islands and in the harpoon fishery for small cetaceans at St Vincent. Small numbers were taken by French and Spanish fishermen for human consumption in the Mediterranean (Jefferson *et al.*, 1993; Perrin *et al.*, 1994). Incidental catches are known to occur in gillnets in the north-eastern Indian Ocean, in tuna purse seines in the eastern tropical Pacific, in fisheries in the northeastern Atlantic, in drift nets, purse seines and other gear in the Mediterranean. Between 1990 and 2003 the driftnet fleet targeting swordfish caused estimated bycatch mortality of over 5000 striped dolphins every year in the Alboran Sea and Irish coast (Rogan and Mackey, 2007). Incidental catch of this species in gillnet is occasionally reported in Indian waters. However, compared to spinner dolphin, entanglement of these dolphins is less in Indian seas. Overfishing of potential prey of striped dolphin has eventually become a potential threat to this species (Reyes, 1991). Organochlorine accumulation and noise pollution are also potential threats to this species.

20.10 Conservation status

The species is listed in Appendix II of CITES.

IUCN status: Least concern

Indian status: Data Deficient

Delphinus capensis

Long-beaked common dolphin

Fig. 21b. A pod of breaching *Delphinus capensis* sighted off Kochi, Kerala on 8.09.2009

Tursiops aduncus

Indo-Pacific bottlenose dolphin

Photo: V. Ravi

Fig. 22a. *Tursiops aduncus* stranded at Vellar Estuary, Parangipettai, Tamilnadu on 26.05.2010

Sousa chinensis

Indo-Pacific humpbacked dolphin

Fig. 23a. *Sousa chinensis* sighted off Karwar, Karnataka on 9.03.2010, showing the large dorsal hump, suggesting that it may be an adult male

Order Sirenia

Family Dugongidae

Fig. 26a. *Dugong dugon*

Fig. 26b. *Dugong dugon* stranded at Neil Island, Andaman on 25.12.2008 and the skin is sprinkled with short hairs

Dugong dugon

Sea cow

Fig. 26c. A female *Dugong dugon* stranded at the seagrass bed of Athirampattinam (feeding ground), Tamilnadu on 5.06.2011

Fig. 26e. Villagers lifting the cetacean-like bilobed tail fluke of *Dugong dugon* stranded at Athirampattinam, Tamilnadu on 5.06.2011

(Prater, 1928; Das and Dey, 1999). Many hundreds of dugong herds were reported to have once occurred in Palk Strait between India and Sri Lanka (Annandale, 1905; Deraniyagala, 1965). However, occurrence of dugongs has become very sparse in all its distribution range in Indian coastal waters. Dugongs are believed to be completely extinct in the Lakshadweep Islands (Husar, 1975).

Fig. 26f. A female *Dugong dugon* stranded at Athirampattinam, Tamilnadu on 5.06.2011 showing the paddle shaped flipper and mammary gland in the flipper pit

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